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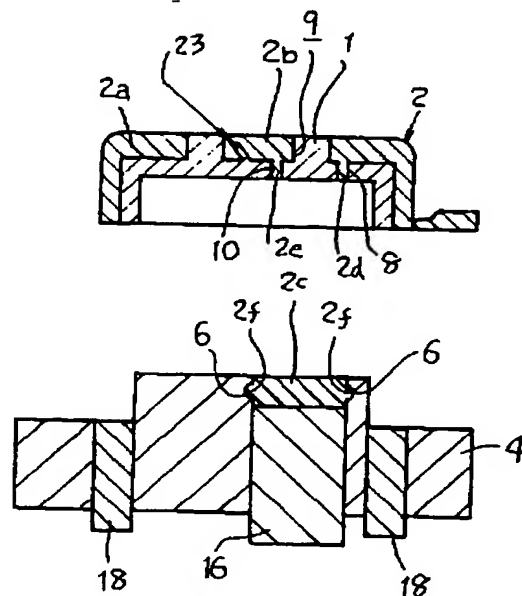
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(54) 【発明の名称】 キートップの二色成形方法

(57) 【要約】

【目的】 文字や図形の識別の明瞭性に優れたキートップの二色成形方法を提供する。

【構成】 光遮蔽性樹脂2の流し込み時にセカンドショットの金型4内に形成された光遮蔽性樹脂の牽引用部分2cを、セカンドショットの金型5、4の型開きの後に、突出しピン18によってキートップを分離するとき第1流路8内の光遮蔽性樹脂の分断用部分2dおよび第2通路10内の光遮蔽性樹脂の分断用部分2eから切り離す。また、ファーストショットにおいて光遮蔽性樹脂の隔離部分2bに、隔離部分2bを包囲する光透過性樹脂1よりも高さの低い楔リブ23を成形する。



【特許請求の範囲】

【請求項1】 ファーストショットで光透過性樹脂1の射出成形を行ない、セカンドショットで光遮蔽性樹脂2の射出成形を行ない、光遮蔽性樹脂成形部分2には本体部分2aから孤立し、光透過性樹脂の成形部分1で包囲される隔離部分2bがあるキートップの二色成形方法であって、ファーストショットにおいて、光遮蔽性樹脂成形部分2の本体部分2aが成形されるべき空間7の背面側にあたる光透過性樹脂成形部分1の適所に、背面側に開口した狭隘な第1流路8を設けると共に、光遮蔽性樹脂成形部分2の隔離部分2bが成形されるべき空間9の背面側にあたる光透過性樹脂成形部分1の適所に、背面側に開口した狭隘な第2流路10を設け、セカンドショットにおいて、一方の金型5の成形用空間7に充填した光遮蔽性樹脂2を、第1流路8を通して他方の金型4の牽引用部分成形用空間11に充填すると共に、該牽引用部分成形用空間11から第2流路10を通して一方の金型5の隔離部分成形用空間9に光遮蔽性樹脂2を充填し、金型5、4を型開きした後、金型4から突出しピン18によってキートップを分離する時、前記成形用空間11内の光遮蔽性樹脂の牽引用部分2cが金型4に残ることを特徴とするキートップの二色成形方法。

【請求項2】 セカンドショットの金型5、4を型開きした後、突出しピン18によってキートップを分離する時、前記成形用空間11内の光遮蔽性樹脂の牽引用部分2cと第1流路8内の光遮蔽性樹脂の分断用部分2dおよび第2流路10内の光遮蔽性樹脂の分断用部分2eを光遮蔽性樹脂の牽引用部分2cと分断する、請求項1に記載の二色成形方法。

【請求項3】 光透過性樹脂部分1で包囲される光遮蔽性樹脂の隔離部分2bを複数個有する文字や図形を表わすキートップの成形、または光透過性樹脂部分1で包囲される光遮蔽性樹脂の隔離部分2bのある文字や図形を複数個表わすキートップの成形において、光遮蔽性樹脂の牽引用部分成形用空間11を拡張し、第2流路形成用ピン14を前記隔離部分2bに対応して複数個設ける、請求項1または請求項2に記載の二色成形方法。

【請求項4】 一方の金型3に向かって進退する立てスライドピン16を他方の金型4に設け、ファーストショット後に該立てスライドピン16を金型3と反対の方向に向かって後退させることによって、光遮蔽性樹脂の牽引用部分2cの成形用空間11を金型4内に作り出し、該成形用空間11の内側面にあらかじめアンダーカット6を設けて置き、セカンドショット後に金型5、4を型開きしたとき、外側面のアンダーカット部分2fによって牽引用部分2cを金型4に残すようにした、請求項1、請求項2、請求項3または請求項4に記載の二色成形方法。

【請求項5】 セカンドショット後に金型5、4を型開きし、金型4から突出しピン18によってキートップを

分離した後、金型4に残った光遮蔽性部分の牽引用部分2cを、金型4に設けた立てスライドピン16を進めることによって、牽引用部分2cを金型4から突き出すようにした、請求項1、請求項2、請求項3または請求項4に記載の二色成形方法。

【請求項6】 光透過性樹脂成形部分1から延長し、セカンドショットの光遮蔽性樹脂成形部分の隔離部分成形用空間9にあたる位置に突出する楔りブ23を、ファーストショットの光透過性樹脂によって形成するようにした、請求項1、請求項2または請求項3に記載の二色成形方法。

【請求項7】 ファーストショットの光透過性樹脂にポリアセタール樹脂、ポリアミド樹脂あるいはポリプロピレン樹脂を使用し、セカンドショットの光遮蔽性樹脂にABS樹脂等のスチレン系樹脂を使用するようにした、請求項1、請求項2、請求項3、請求項4、請求項5または請求項6に記載の二色成形方法。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明はカーラジオ、カーステレオ、プッシュホンダイヤル等の各種入力に使用される照光性のキートップの二色成形方法に関するものである。

【0002】

【従来の技術】文字や図形部分を光透過性樹脂で成形し、それ以外の部分を光遮蔽性樹脂で成形してキートップを成形するとき、“O”や“A”などの文字や図形を表すキートップでは、図17と図18に示したように光遮蔽性樹脂の成形部分22には、光透過性樹脂の成形部分21の外側空間を埋める本体部分22aのほかに、閉曲線を描く光透過性樹脂の成形部分21で包囲された隔離部分22bが存在することになる。

【0003】従来の二色成形法では、ファーストショットの金型にスライド機構を設け、セカンドショットで隔離部分成形用空間に光遮蔽性樹脂22を流し込むためにトンネルのような流路を形成している。この流路は光遮蔽性樹脂の成形部分22の本体部分22aから伸びて、文字や図形を表す光透過性樹脂成形部分の一部の背後を通過しているため、隔離部分成形用空間に光遮蔽性樹脂22を充填したときには、当該流路に光遮蔽性樹脂が残されることになる。

【0004】この流路内の光遮蔽性樹脂部分22cは、電球や発光ダイオード等の光源を背面側に置いてキートップを照光使用するとき、光透過性樹脂成形部分21に影となって現れるため、当該部分における文字や図形の識別の明瞭性を低減させている。また、流路形成用のスライド機構の形状構造が複雑であるため、金型製作が容易でなく製作コストが高くなる。

【0005】また、従来、照光性のキートップを二色成形方法で作成するための代表的な材料として、光透過性樹脂成形部分に光の透過性のあるポリカーボネイトやA

BS樹脂、メタクリル樹脂等を使用し、光遮蔽性樹脂成形部分に光の透過性の無いポリカーボネイトやABS樹脂等を使用することが知られている。

【0006】このように従来使用されてきた樹脂の組合せによって二色成形を行った場合、ファーストショット終了後に冷却固化されていた光透過性樹脂が、セカンドショットにおいて加熱溶融、加圧された光遮蔽性樹脂の注入によって2つの樹脂の接合面が融着し、あたかも境界面が存在しないかのように一体化される。

【0007】このように接合面が融着された状態では、図19に示したように、光透過性樹脂部分の背後から入射角度を持って照射された光が、光透過性樹脂と光遮蔽性樹脂との境界面で反射してキートップの外に放射される割合は少なくなり、文字や図形の明るさを減らして明瞭性を低下させる。

【0008】

【発明が解決しようとする課題】従って本発明の目的は、光透過性樹脂成形部分の背後に光遮蔽性樹脂成形部分が残存せず、また光透過性樹脂成形部分と光遮蔽性樹脂成形部分の境界面の融着を阻害するために、明るく、文字や図形の識別の明瞭性に優れたキートップを成形することができる二色成形方法を提供することである。

【0009】

【課題を解決するための手段】以下、添付図面中の参照符号を用いて説明すると、本発明のキートップの二色成形方法は、ファーストショットで光の透過性のあるポリアセタール樹脂ないしポリアミド樹脂、ポリプロピレン樹脂を使用した光透過性樹脂1の射出成形を行ない、セカンドショットで光の透過性の無いABS樹脂等のステレン系樹脂で光遮蔽性樹脂2の射出成形を行なうものであり、光遮蔽性樹脂成形部分2には本体部分2aから孤立し、光透過性樹脂成形部分1で包囲される隔離部分2bがある。

【0010】ファーストショットにおいて、光遮蔽性樹脂成形部分2の本体部分2aが成形されるべき空間7の背面側にあたる光透過性樹脂成形部分1の適所に、背面側に開口した狭隘な第1流路8を設けると共に、光遮蔽性樹脂成形部分2の隔離部分2bが成形されるべき空間9の背面側にあたる光透過性樹脂成形部分1の適所に、背面側に開口した狭隘な第2流路10と楔リブ23を設ける。

【0011】セカンドショットにおいて、一方の金型5の成形用空間7に充填した光遮蔽性樹脂2を、第1流路8を通して他方の金型4の牽引用部分成形用空間11に充填すると共に、該牽引用部分成形用空間11から第2流路10を通して一方の金型5の隔離部分成形用空間9に光遮蔽性樹脂2を充填する。

【0012】他方の金型5を一方の金型4から引き離した後、金型4に残った成形品は突出しピン18によって金型4から突き出されるが、このときに光遮蔽性樹脂成

形部分の分断用部分2d、2eの周辺で樹脂が分断され、光遮蔽性樹脂の牽引用部分2cだけが金型4に残る。このようにして成形されたキートップは、電球や発光ダイオード等の光源を背面側において照光使用される。

【0013】

【実施例】図示の実施例では、金型4はファーストショットの下側金型とセカンドショットの下側金型の両方に兼用されている。この金型4には、ファーストショットの上側金型3に向かって進退する立てスライドピン16を設けてある。下側金型4には、立てスライドピン16が上側金型3に向かって最も前進した位置にあるとき、立てスライドピン16の上端部側面が当接する部位に、あらかじめアンダーカット6を設けてある。

【0014】ファーストショットの上側金型3に取り付けた円柱状の第1流路形成用ピン13は、セカンドショットにおいて光遮蔽性樹脂成形部分2の本体部分2aが成形されるべき空間7に対応した位置にて光透過性樹脂の文字部または図形部形成用空間17に突出し、下端面が下側金型4の立てスライドピン16の上端面に密接している。

【0015】また、上側金型3に取り付けた円柱状の第2流路形成用ピン14は、セカンドショットにおいて光遮蔽性樹脂成形部分2の隔離部分2bが成形されるべき空間9に対応した位置にて文字部または図形部形成用空間17に突出し、下端面が立てスライドピン16の上端面に密接している。

【0016】また上側金型3には、光透過性樹脂の図形部形成用空間17から伸びて、隔離部分2aが成形されるべき空間9に突出する、周囲の図形部形成用空間17より低く、図形部形成用空間17の側壁に接触しない位置に、薄い壁形状の楔リブ形成用空間17aを設ける。

【0017】図1から図3に示したファーストショットにおいて、公知の射出ユニットからの光透過性樹脂1は、上側金型3の樹脂注入口（トンネルゲート）12から上側金型3の文字部または図形部形成用空間17と楔リブ形成用空間17aに充填される。

【0018】光透過性樹脂1で文字部または図形部を成形した後、ファーストショットの上側金型3と下側金型4を型開きすると、キートップの半製品には、ピン13の先端部に抜き取り跡に第1流路8が形成され、ピン14の先端部の抜き取り跡に第2流路10が形成されている。

【0019】ファーストショットの成形終了後、図3に示したように下側金型4の立てスライドピン16を上側金型3と反対の方向に後退させると、すなわち下方向に移動させると、下側金型4内には、光遮蔽性樹脂の牽引用部分2cの成形用空間11が作り出される。下側金型4の前記アンダーカット6は、成形用空間11の内側面に当たる部位に現れる。

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【0020】図4から図7に示したセカンドショットにおいて、公知の射出ユニットからの光遮蔽性樹脂2は、上側金型5の樹脂注入口（サイドゲート）15から上側金型5の成形用空間7に充填される。この光遮蔽性樹脂2は該成形用空間7から第1流路8を通して下側金型4の牽引用部分成形用空間11に充填され、更にまた該成形用空間11から第2流路10を通して上側金型5の隔離部分成形用空間9に充填される。下側金型4のアンダーカット6によって、牽引用部分2cの側面には、外側に凸のアンダーカット部分2fが形成される。

【0021】この時に成形用空間7に突出していた楔りブ23は、成形用空間7に流れ込んだ光遮蔽性樹脂2の熱と圧力によって変形し、光遮蔽性樹脂2の冷却、固化に伴って変形した形状を保ったまま残る。

【0022】文字の内側空間と外側空間を光遮蔽性樹脂2で成形した後、セカンドショットの上側金型5と下側金型4を型開きすると、下側金型4には牽引用部分2cを含むキートップが残る。さらに下側金型4から突出しピン18によってキートップを分離する時、前記アンダーカット部分2fのために第1流路8内の光遮蔽性樹脂の分断用部分2dと第2流路10内の光遮蔽性樹脂の分断用部分2eには引張荷重が集中して付加されるため、図6に示したように光遮蔽性樹脂成形部分2はこれらの箇所で見えなくなると分離される。

【0023】この時に本発明のように、光透過性樹脂としてポリアセタール樹脂あるいはポリアミド樹脂、ポリプロピレン樹脂を使用し、光遮蔽性樹脂としてABSなどのスチレン系を使用すると、光透過性樹脂と光遮蔽性樹脂の接触面での融着が阻害されるため、光遮蔽性樹脂の牽引用部分2cは光透過性樹脂と接触している牽引用部分の境界面2gにおいて容易に分離される。

【0024】また、この時にキートップに残った光遮蔽性樹脂の隔離部分2bは、変形した楔りブ23が曲がった楔として作用するため、周囲の光透過性樹脂1と融着していない状態でも分離して脱落することがない。

【0025】隔離部分2aへ光遮蔽性樹脂2を流し込むために下側金型4内に成形され、分断時の引張り手段として使用された光遮蔽性樹脂の牽引用部分2cは、図7に示したように下側金型4の上下方向に進退する立てスライドピン16によって成形用空間11から強制的に突き出される。

【0026】牽引用部分2cの側面にアンダーカット部分2fを形成する下側金型4のアンダーカット6は、牽引用部分2cが突出しピン18によってキートップを分離する際には成形用空間11から脱出しなくても、立てスライドピン16による突き出し時には抜け出るような摩擦抵抗ないし引っ掛かり抵抗が得られるように設定される。牽引用部分2cの側面形状は、これに限定されず、前記機能を達成できる範囲内で種々変更することができる。

6

【0027】例えば、「B」のように光透過性樹脂部分1で包囲された光遮蔽性樹脂の隔離部分2bを複数個有する文字や図形を表わすキートップの場合、または「A B」のように光透過性樹脂部分1で包囲された隔離部分2bを有する文字や図形を複数個表わすキートップの場合には、図10から図15に示したように光遮蔽性樹脂の牽引用部分成形用空間11を拡張し、第2流路形成用ピン14と楔りブ成形用空間17aを隔離部分2bの個数に対応して所要部位に追加する。

10 【0028】この実施例では、光遮蔽性樹脂2は一つの第1流路8から牽引用部分成形用空間11を経由して複数の隔離部分成形用空間9に光遮蔽性樹脂2を充填される。その他の構成および作用については前記実施例と同様である。

【0029】

【発明の効果】以上のように本発明方法では、光遮蔽性樹脂2の流し込み時にセカンドショットの金型4内に形成された光遮蔽性樹脂の牽引用部分2cは、金型4から突出しピン18によって分離される時に第1流路8内の光遮蔽性樹脂の分断用部分2dと第2通路10内の光遮蔽性樹脂の分断用部分2eから切り離されてしまい、最終製品のキートップには何ら残存していないため、キートップの照光使用時に光透過性樹脂成形部分1に影ができることは一切なく、文字や図形の識別の明瞭性に優れたキートップが得られる。

【0030】また、光透過性樹脂としてポリアセタール樹脂やポリプロピレン樹脂、ポリアミド樹脂を使用し、光遮蔽性樹脂としてABS樹脂に代表されるスチレン系樹脂を使用するために、光透過性樹脂と光遮蔽性樹脂が融着しないため、セカンドショット終了後に金型5を分離する際、あるいは突き出しピン18を突き出して金型4から分離する際にキートップに加わる圧力を徐々に変えることにより、光透過性樹脂と光遮蔽性樹脂の接触する壁側境界面2hを剥離して空気層である薄い空間24を作ることができる。

【0031】キートップ裏側から光源を点灯させた場合、従来の二色成形方法では光透過性樹脂と光遮蔽性樹脂が接触面で融着しているために、光透過性樹脂に角度を持って入射した光の壁側境界面2hでの屈折の大きさは光透過性樹脂と光遮蔽性樹脂の屈折率の差によって決まる。光透過性樹脂と光遮蔽性樹脂に種類の異なる樹脂を使用した場合においても、二色成形に使用される多くの樹脂の光の屈折率(nD)はだいたい1.4~1.6の範囲にあることから、壁側境界面2hにおける屈折率の差は少なく、壁側境界面2hで反射してキートップの外部に放射される光の量を減少させる。

【0032】それに対して、本発明の二色成形方法では、壁側境界面2hでの屈折率の差は光透過性樹脂1と光の屈折率(nD)が1.0である空気層24との差となるため、樹脂どうしが溶着している場合に比べて屈折

率の差が大きく、図20に示したように、壁側境界面2hで反射してキートップの外部に放射される光の量を増加させ、文字や図形の識別性に優れた明るいキートップが得られる。

【0033】なお、このような光透過性樹脂と光遮蔽性樹脂の接触する壁側境界面2hの剥離は、特に手段を講じ無くともセカンドショット終了後に金型5を分離する際、あるいは突き出しピン18を突き出してキートップを金型4から分離する際にキートップに加わる圧力により生じるが、例えば光透過性樹脂成形部分から光遮蔽性部分が脱落しない程度のアンダーカットを金型4に設けたり、成形終了後に金型から分離したキートップを手で曲げたり、あるいは治具を使用して圧力を加えたりすればより一層確実な剥離を行うことができる。

【0034】

【実施例の効果】円柱状の第1流路形成用ピン13と第2流路形成用ピン14をファーストショットの金型3に設け、該ピン13の抜き取り跡に第1流路8を形成し、該ピン14の抜き取り跡に第2流路10を形成するようにしたので、光遮蔽性樹脂2の流路を形成するためのスライド機構を省略でき、金型の製作コストを低減させることができる。

【0035】セカンドショットの金型4に牽引用部分形成用空間11に向かって進退する立てスライドピン16を設け、該立てスライドピン16によって成形用空間11から牽引用部分2cを突き出すようにしたので、当該金型4の掃除が簡略化され、直ちに次の成形サイクル*

*に移ることができ、成形の作業能率が良い。

【0036】光遮蔽性樹脂の隔離部分2bを複数個有する文字や図形を表わすキートップの成形、または隔離部分2bのある文字や図形を複数個表わすキートップの成形において、光遮蔽性樹脂の牽引用部分形成用空間11を拡張し、第2流路形成用ピン14を隔離部分2bに対応して複数個設けたときには、一つの第1流路8から複数の隔離部分形成用空間9に光遮蔽性樹脂2を充填することができるので、金型の加工が容易となり、製作コストを安くすることができる。

【0037】

【実施例2】本発明の二色成形方法によってキートップを成形するに当たり、ファーストショットの光透過性樹脂として、ポリアセタール樹脂（三菱ガス化学株式会社製ユピタルF40-03）を使用し、また、ポリアセタール樹脂と比較するためにポリカーボネイト樹脂（三菱ガス化学株式会社製ユーピロンH3000R）、メタクリル樹脂（三菱レーヨン株式会社製VR-40）、およびABS樹脂（日本合成ゴム株式会社製JSR ABS55）を使用して、文字部分を成形した。

【0038】次にセカンドショットの光遮蔽性樹脂として黒色に着色されたABS樹脂（日本合成ゴム株式会社製JSR ABS38B）を使用して文字の周囲を覆ったキートップを作成し、同じ光源をキートップ裏側から点灯させて目視による視認性のテストを行い、表1の結果を得た。

【表1】

光透過性樹脂	光源消灯時の視認性	点灯時の光の透過性	点灯時の文字の明るさ
ポリアセタール	○	○	◎
ポリカーボネイト	△	△	△
アクリル樹脂	△	△	△
ABS樹脂	×	×	×

◎：極めて良好 ○：良好

△：やや劣る ×：劣る

【0039】

【実施例3】図16に示したように本発明方法によって隔離部分を持つ文字である“R”の文字キートップを作成するに当たり、文字の隔離部分に楔リブを設けない金型を使用した以外は本発明と同様な方式の二色成形方法によって楔リブの無いキートップを成形し、次に隔離部

分に隔離部分を囲む文字の部分に接触せず、文字に相当する部分より高さの低い、厚み0.3mmの壁形状の楔リブを設けた金型を使用して楔リブのあるキートップを成形した。

【0040】この2種類のキートップの裏面から圧力を加えて隔離部分が脱落するために必要とする圧力を測定

し、表2の結果を得た。

* * 【表2】

個数	1	2	3	4	5	6	7	8	9	10	平均
楔リブなし	129	168									148.5
楔リブ付き	530	530	530	530	530	515	492	530	530	509	522.6

単位：グラム

なお、光透過性樹脂としてはポリアセタール樹脂（三菱ガス化学株式会社製ユピタルF40-03）を使用し、光遮蔽性樹脂としては黒に着色されたABS樹脂（日本合成ゴム株式会社製JSR ABS38B）を使用した。

【0041】前記実施例では楔リブ23として周囲の文字部分の壁側境界面2hに接触しない長方形の板状リブを設けたが、実用上においては隔離部分の脱落がおきず、また隔離部分に光遮蔽性樹脂が十分に充填できる状態であれば、長方形の板状のリブの端を伸ばして壁側境界面2hと一体化させてもよし、リブの形状としても円筒状、円錐状、その他の任意の形状の突起を1箇所あるいは複数箇所に設けても良い。

【図面の簡単な説明】

【図1】本発明方法の一実施例を示し、ファーストショットにおいて光透過性樹脂を充填する直前における上下金型の縦断面図である。

【図2】ファーストショットにおいて光透過性樹脂を充填した直後における上下金型の縦断面図である。

【図3】ファーストショットにおいて上下金型の型開きを行ない、立てスライドピンを移動させて牽引用部分の成形用空間を下側金型に作り出した状態の縦断面図である。

【図4】セカンドショットにおいて光遮蔽性樹脂を充填する直前における上下金型の縦断面図である。

【図5】セカンドショットにおいて光遮蔽性樹脂を充填した直後における上下金型の縦断面図である。

【図6】セカンドショットにおいて上下金型の型開きを行ない、突出しピンによって光遮蔽性樹脂の牽引用部分を分断した状態の縦断面図である。

【図7】セカンドショットの下側金型から光遮蔽性樹脂の牽引用部分を立てスライドピンで突き出したときの縦断面図である。

【図8】金型から外したキートップの縦断面図であり、矢印の方向から照光して使用される。

【図9】該キートップの正面図である。

【図10】光遮蔽性樹脂の隔離部分が複数あるキートップを成形する本発明の別の実施例を示し、ファーストショットで光透過性樹脂を充填する直前における上下金型の縦断面図である。

【図11】ファーストショットにおいて光透過性樹脂を充填した直後における上下金型の縦断面図である。

【図12】セカンドショットにおいて光遮蔽性樹脂を充填した直後における上下金型の縦断面図である。

【図13】セカンドショットの下側金型から光遮蔽性樹脂の牽引用部分を立てスライドピンで突き出したときの縦断面図である。

【図14】金型から外したキートップの縦断面図であり、矢印の方向から照光して使用される。

【図15】図14のキートップの正面図である。

【図16】本発明の更に別の実施例に係るキートップの作成過程の斜視図である。

【図17】従来方法で成形されたキートップの縦断面図であり、矢印の方向から照光使用される。

【図18】図17に示したキートップの正面図である。

【図19】従来方法で作成されたキートップの光透過性樹脂と光遮蔽性樹脂の境界面における入射光の反射モデルを示す要部断面図である。

【図20】本発明方法で作成されたキートップの光透過性樹脂と光遮蔽性樹脂の境界面における入射光の反射モデルを示す要部断面図である。

【符号の説明】

1 文字部または図形部用の光透過性樹脂成形部分

2 光遮蔽性樹脂成形部分

2a 光遮蔽性樹脂成形部分の本体部分

2b 光遮蔽性樹脂成形部分の隔離部分

2c 光遮蔽性樹脂成形部分の牽引用部分

2d 光遮蔽性樹脂成形部分の分断用部分

2e 光遮蔽性樹脂成形部分の分断用部分

2f 牽引用部分のアンダーカット部分

2g 光透過性樹脂と接触している牽引用部分の境界面

2h 光透過性樹脂と光遮蔽性樹脂の接触する壁側境界面

3 ファーストショット用金型

4 ファーストショットとセカンドショットに兼用の金型

5 セカンドショット用金型

6 金型のアンダーカット

7 光遮蔽性樹脂成形部分の本体部分成形用空間

8 第1流路

11

12

- 9 光遮蔽性樹脂成形部分の隔離部分成形用空間
 10 第2流路
 11 牽引用部分成形用空間
 12 ファーストショットの樹脂注入口
 13 第1流路形成用ピン
 14 第2流路形成用ピン
 15 セカンドショットの樹脂注入口

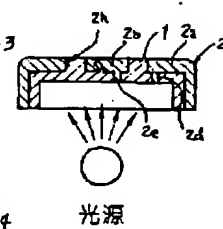
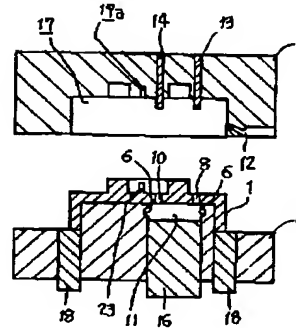
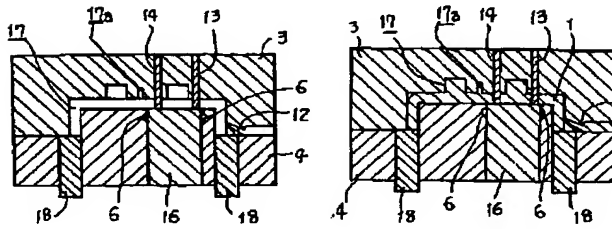
- 16 立てスライドピン
 17 光透過性樹脂成形部分の成形用空間
 17a 楔リブ成形用空間
 18 突出しピン
 23 楔リブ
 24 剥離によって生じた空気層

【図1】

【図2】

【図3】

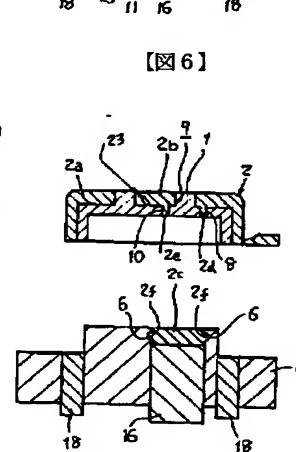
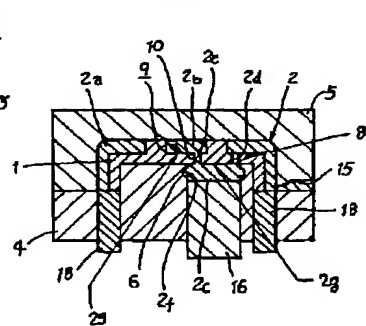
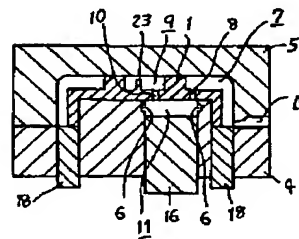
【図8】



【図4】

【図5】

【図6】

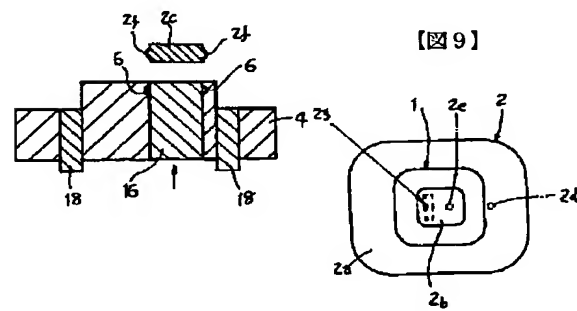


【図7】

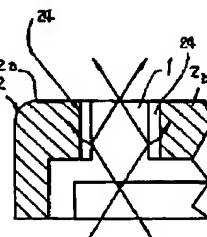
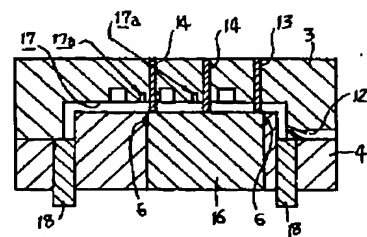
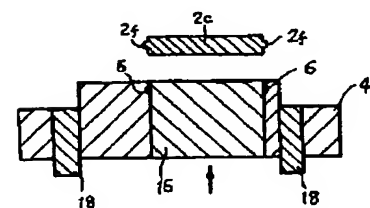
【図9】

【図10】

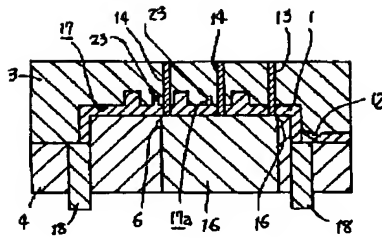
【図20】



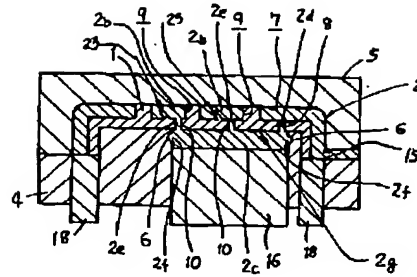
【図13】



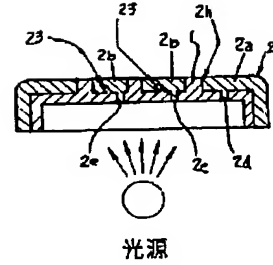
【図11】



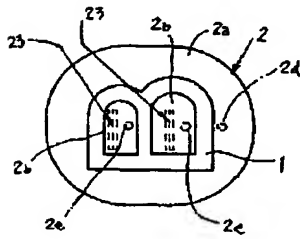
【図12】



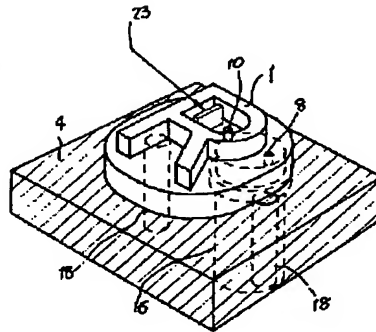
【図14】



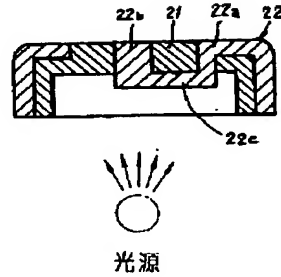
【図15】



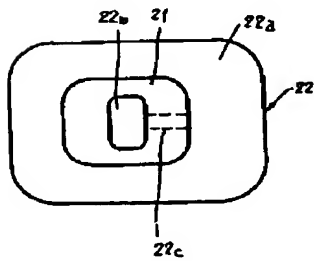
【図16】



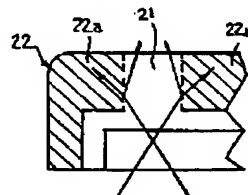
【図17】



【図18】



【図19】



フロントページの続き

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技術表示箇所

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CLAIMS

[Claim(s)]

[Claim 1] Perform injection molding of the light-transmission nature resin 1 at a first shot, and injection molding of the optical cover nature resin 2 is performed at a second shot. Into the optical cover nature resin fabrication portion 2, by this soma, are isolated from 2a, and are the two-color-molding method of a keytop with isolation partial 2b surrounded in the forming portion 1 of a light-transmission nature resin, and it sets at a first shot. While establishing the 1st narrow passage 8 which carried out opening to the tooth-back side in the proper place of the light-transmission nature resin fabrication portion 1 which hits the tooth-back side of the space 7 where this soma part 2a of the optical cover nature resin fabrication portion 2 should be fabricated. Establish the 2nd narrow passage 10 which carried out opening to the tooth-back side in the proper place of the light-transmission nature resin fabrication portion 1 which hits the tooth-back side of the space 9 where isolation partial 2b of the optical cover nature resin fabrication portion 2 should be fabricated, and it sets to a second shot. While filling up the space 11 for partial fabrication of the metal mold 4 of another side for towage with the optical cover nature resin 2 with which the space 7 for fabrication of one metal mold 5 was filled up through the 1st passage 8. The space 9 for isolation partial fabrication of one metal mold 5 is filled up with the optical cover nature resin 2 through the 2nd passage 10 from this space 11 for partial fabrication for towage. The two-color-molding method of the keytop characterized by partial 2c for towage of the optical cover nature resin in the aforementioned space 11 for fabrication remaining in metal mold 4 when a knock-out pin 18 separates a keytop from metal mold 4 after carrying out the mold aperture of the metal mold 5 and 4.

[Claim 2] The two-color-molding method according to claim 1 which divides partial for fragmentation 2 of optical cover nature resin in 2d [of portions for fragmentation of the optical cover nature resin in partial 2c for towage of the optical cover nature resin in the aforementioned space 11 for fabrication, and the 1st passage 8], and 2nd passage 10 e with partial 2c for towage of an optical cover nature resin when a knock-out pin 18 separates a keytop after carrying out the mold aperture of the metal mold 5 and 4 of a second shot.

[Claim 3] Fabrication of the keytop showing the character which has two or more isolation partial 2b of the optical cover nature resin surrounded in the light-transmission nature resin portion 1, or a figure, Or a character with isolation partial 2b of the optical cover nature resin surrounded in the light-transmission nature resin portion 1 and a figure are set to fabrication of the keytop to express [two or more]. The two-color-molding method according to claim 1 or 2 of extending the space 11 for partial fabrication of an optical cover nature resin for towage, and forming two or more pins 14 for the 2nd passage formation corresponding to the aforementioned isolation partial 2b.

[Claim 4] By moving up toward one metal mold 3, forming a slide pin 16 in the metal mold 4 of another side, and retreating this **** slide pin 16 toward a direction opposite to metal mold 3 after a first shot. When the space 11 for fabrication of partial 2c for towage of an optical cover nature resin is made in metal mold 4, an undercut 6 is beforehand prepared and put on the medial surface of this space 11 for fabrication and the mold aperture of the metal mold 5 and 4 is carried out after a second shot. The claim 1 and claim 2 which left partial 2c for towage to metal mold 4 by 2f of undercut portions of the lateral surface, the two-color-molding method according to claim 3 or 4.

[Claim 5] The claim 1 and claim 2 which projected partial 2c for towage from metal mold 4 by having prepared up partial 2c for towage of the optical cover nature resin which remained in metal mold 4, and advancing a slide pin 16 after it carries out the mold aperture of the metal mold 5 and 4 and a knock-out pin 18 separates a keytop from metal mold 4 after a second shot, the two-color-molding method according to claim 3 or 4.

[Claim 6] The claim 1 which extends from the light-transmission nature resin fabrication portion 1, and formed the wedge rib 23 which projects in the position equivalent to the space 9 of a for [isolation partial fabrication] of the optical cover nature resin fabrication portion of a second shot with the light-transmission nature resin of a first shot, the two-color-molding method according to claim 2 or 3.

[Claim 7] The claim 1 and claim 2 which use polyacetal resin, polyamide resin, or polypropylene resin for the light-transmission nature resin of a first shot, and used styrene resins, such as ABS plastics, for the optical cover nature resin of a second shot, a claim 3, a claim 4, the two-color-molding method according to claim 5 or 6.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the two-color-molding method of the keytop of the illumination nature used for various inputs, such as a car radio, a car stereo, and a push-button phone dial.

[0002]

[Description of the Prior Art] When fabricating a character and a figure portion by the light-transmission nature resin, fabricating the other portion by the optical cover nature resin and fabricating a keytop, in the keytop showing characters and figures, such as "O" and "A" As shown in drawing 17 and drawing 18 , isolation partial 22b surrounded in the forming portion 21 of the light-transmission nature resin describing the closed contour other than this soma part 22a which fills the outside space of the forming portion 21 of a light-transmission nature resin will exist in the forming portion 22 of an optical cover nature resin.

[0003] By the conventional two-color-molding method, a sliding mechanism is formed in the metal mold of a first shot, and in order to slush the optical cover nature resin 22 into the space for isolation partial fabrication at a second shot, passage like a tunnel is formed. This passage is extended from this soma part 22a of the forming portion 22 of an optical cover nature resin, and since it has passed through some backs of the light-transmission nature resin fabrication portion showing a character or a figure, when the space for isolation partial formation is filled up with the optical cover nature resin 22, an optical cover nature resin will be left behind to the passage concerned.

[0004] Since optical cover nature resin partial 22c in this passage becomes a shadow and appears in the light-transmission nature resin fabrication portion 21 when putting the light sources, such as an electric bulb and light emitting diode, on a tooth-back side and carrying out illumination use of the keytop, it is reducing the legibility of discernment of the character in the portion concerned, or a figure. Moreover, since the configuration structure of the sliding mechanism for passage formation is complicated, golden die making is not easy and manufacture cost becomes high.

[0005] Moreover, using a polycarbonate with the permeability of light, ABS plastics, methacrylic resin, etc. for a light-transmission nature resin fabrication portion as a typical material for creating the keytop of illumination nature by the two-color-molding method conventionally, and using the polycarbonate which does not have the permeability of light in an optical cover nature resin fabrication portion, ABS plastics, etc. is known.

[0006] Thus, when the combination of the resin used conventionally performs two color molding, in a second shot, the plane of composition of two resins welds [the light-transmission nature resin by which cooling solidification was carried out after the first shot end] by pouring of heating melting and the pressurized optical cover nature resin, an interface exists, and it is unified as if there was nothing.

[0007] Thus, in the state where the plane of composition was welded, as shown in drawing 19 , the rate at which the light irradiated with the degree of incident angle behind behind the light-transmission nature resin portion reflects in the interface of a light-transmission nature resin and an optical cover nature resin, and is emitted out of a keytop decreases, reduces the luminosity of a character or a figure, and reduces legibility.

[0008]

[Problem(s) to be Solved by the Invention] Therefore, in order for an optical cover nature resin fabrication portion not to remain behind a light-transmission nature resin fabrication portion and to check weld of the interface of a light-transmission nature resin fabrication portion and an optical cover nature resin fabrication portion, the purpose of this invention is bright and is offering the two-color-molding method which can fabricate the keytop excellent in the legibility of discernment of a character or a figure.

[0009]

[Means for Solving the Problem] When it explains using the reference mark in an accompanying drawing, hereafter the two-color-molding method of the keytop of this invention Polyacetal resin or polyamide resin which has the permeability of light at a first shot, Injection molding of the light-transmission nature resin 1 which used polypropylene resin is performed. Injection molding of the optical cover nature resin 2 is performed by styrene resins, such as ABS plastics which do not have the permeability of light at a second shot, it is isolated from this soma part 2a into the optical cover nature resin fabrication portion 2, and there is isolation partial 2b surrounded in the light-transmission nature resin fabrication portion 1.

[0010] While establishing the 1st narrow passage 8 which carried out opening to the tooth-back side in the proper place of the light-transmission nature resin fabrication portion 1 which hits the tooth-back side of the space 7 where this soma part 2a of the optical cover nature resin fabrication portion 2 should be fabricated in a first shot The 2nd narrow passage 10 and the wedge rib 23 which carried out opening to the tooth-back side are prepared for the proper place of the light-transmission nature resin fabrication portion 1 which hits the tooth-back side of the space 9 where isolation partial 2b of the optical cover nature resin fabrication portion 2 should be fabricated.

[0011] In a second shot, while filling up the space 11 for partial fabrication of the metal mold 4 of another side for towage with the

optical cover nature resin 2 with which the space 7 for fabrication of one metal mold 5 was filled up through the 1st passage 8, the space 9 for isolation partial fabrication of one metal mold 5 is filled up with the optical cover nature resin 2 through the 2nd passage 10 from this space 11 for partial fabrication for towage.

[0012] Although the mold goods which remained in metal mold 4 are projected by the knock-out pin 18 from metal mold 4 after pulling apart the metal mold 5 of another side from one metal mold 4, a resin is divided around the portions 2d and 2e for fragmentation of an optical cover nature resin fabrication portion at this time, and only partial 2c for towage of an optical cover nature resin remains in metal mold 4. Thus, illumination use of the fabricated keytop is carried out in the light sources, such as an electric bulb and light emitting diode, at a tooth-back side.

[0013]

[Example] the example of illustration — metal mold 4 — the first shot bottom — the metal mold and second shot bottom — it is used also [metal mold / both] this metal mold 4 — a first shot top — it moves up toward metal mold 3, and the slide pin 16 is formed the bottom — metal mold 4 — standing — a slide pin 16 — a top — when it is in the position which moved forward most toward metal mold 3, the undercut 6 is beforehand established in the part to which it stands and which the upper-limit section side of a slide pin 16 contacts

[0014] a first shot top — the position corresponding to the space 7 where, as for the pillar-like pin 13 for the 1st passage formation attached in metal mold 3, this soma part 2a of the optical cover nature resin fabrication portion 2 should be fabricated in a second shot — the character section of a light-transmission nature resin, or the space 17 for figure section formation — projecting — a soffit side — the bottom — metal mold 4 stands and it is close to the upper-limit side of a slide pin 16

[0015] moreover, a top — the pillar-like pin 14 for the 2nd passage formation attached in metal mold 3 is projected to the character section or the space 17 for figure section formation in the position corresponding to the space 9 where isolation partial 2b of the optical cover nature resin fabrication portion 2 should be fabricated in a second shot, and a soffit side stands it, and it is close to the upper-limit side of a slide pin 16

[0016] moreover, a top — to metal mold 3, it is lower than the surrounding space 17 for figure section fabrication which is extended from the space 17 for figure section fabrication of a light-transmission nature resin, and projects to the space 9 where isolation partial 2a should be fabricated, and space 17a for wedge rib fabrication of a thin wall configuration is prepared in the position which does not contact the side attachment wall of the space 17 for figure section fabrication at it

[0017] the first shot shown in drawing 3 from drawing 1 — setting — the light-transmission nature resin 1 from a well-known injection unit — a top — the top from the resin inlet (tunnel gate) 12 of metal mold 3 — the character section of metal mold 3 or the space 17 for figure section fabrication, and space 17a for wedge rib fabrication are filled up

[0018] the first shot top after fabricating the character section or the figure section by the light-transmission nature resin 1 — metal mold 3 and the bottom — if the mold aperture of the metal mold 4 is carried out, it samples to the point of a pin 13 at the half-finished products of a keytop, the 1st passage 8 is formed in marks, and the 2nd passage 10 is formed in the remains of sampling of the point of a pin 14

[0019] it was shown in drawing 3 after the forming end of a first shot — as — the bottom — metal mold 4 — standing — a slide pin 16 — a top — if it is made to retreat in the direction opposite to metal mold 3 (i.e., if it is made to move downward) — the bottom — in metal mold 4, the space 11 for fabrication of partial 2c for towage of an optical cover nature resin is made the bottom — the aforementioned undercut 6 of metal mold 4 appears in the part which hits the medial surface of the space 11 for fabrication

[0020] the second shot shown in drawing 7 from drawing 4 — setting — the optical cover nature resin 2 from a well-known injection unit — a top — the top from the resin inlet (side gate) 15 of metal mold 5 — the space 7 for fabrication of metal mold 5 is filled up this optical cover nature resin 2 — this space 7 for fabrication to the 1st passage 8 — letting it pass — the bottom — the space 11 for partial fabrication of metal mold 4 for towage is filled up — having — further — again — this space 11 for fabrication to the 2nd passage 10 — letting it pass — a top — the space 9 for isolation partial fabrication of metal mold 5 is filled up the bottom — of the undercut 6 of metal mold 4, 2f of undercut portions of a convex is formed outside at the side of partial 2c for towage

[0021] The wedge rib 23 projected to the space 7 for fabrication at this time remains with the configuration maintained which deformed with the heat and pressure of the optical cover nature resin 2 which flowed into the space 7 for fabrication, and deformed with cooling of the optical cover nature resin 2, and solidification.

[0022] the second shot top after fabricating the inside space and outside space of a character by the optical cover nature resin 2 — metal mold 5 and the bottom — if the mold aperture of the metal mold 4 is carried out — the bottom — the keytop containing partial 2c for towage remains in metal mold 4 further the bottom — since a tension load concentrates and is added to partial for division 2e of the optical cover nature resin in 2d of portions for division of the optical cover nature resin in the 1st passage 8, and the 2nd passage 10 for the 2f of the aforementioned undercut portions when a knock-out pin 18 separates a keytop from metal mold 4, as shown in drawing 6, the optical cover nature resin fabrication portion 2 is torn off and divided in these parts

[0023] If polyacetal resin or polyamide resin, and polypropylene resin are used as a light-transmission nature resin at this time and styrene systems, such as ABS, are used for it as an optical cover nature resin like this invention, since weld by the contact surface of a light-transmission nature resin and an optical cover nature resin will be checked, partial 2c for towage of an optical cover nature resin is easily separated in 2g of interfaces of the portion for towage in contact with the light-transmission nature resin.

[0024] Moreover, in the state where it is not welding to the surrounding light-transmission nature resin 1, it dissociates and isolation partial 2b of the optical cover nature resin which remained in the keytop at this time does not drop out, either, in order to act as a wedge at which the transformed wedge rib 23 turned.

[0025] in order to slush the optical cover nature resin 2 into isolation partial 2a — the bottom — it was fabricated in metal mold 4 and partial 2c for towage of the optical cover nature resin used as a tension means at the time of fragmentation was shown in drawing 7 — as — the bottom — it moves up in the vertical direction of metal mold 4, and a slide pin 16 projects compulsorily from the space 11 for fabrication

[0026] the bottom which forms 2f of undercut portions in the side of partial 2c for towage — frictional resistance which stands

although kicked, escapes from the undercut 6 of metal mold 4 at the time of ejection by the slide pin 16 from which it does not escape from the space 11 for fabrication in case partial 2c for towage separates a keytop by the knock-out pin 18, and comes out — or it is set up so that it may be caught and resistance may be obtained. The side configuration of partial 2c for towage is not limited to this, but can be variously changed within limits which can attain the aforementioned function.

[0027] In for example, the case of the keytop showing the character which has two or more isolation partial 2b of the optical cover nature resin surrounded in the light-transmission nature resin portion 1 as shown in "B", or a figure or in the case of the keytop to express [two or more], the character which has isolation partial 2b surrounded in the light-transmission nature resin portion 1 like "AB", and a figure As shown in drawing 15 from drawing 10, the space 11 for partial fabrication of an optical cover nature resin for towage is extended, and the pin 14 for the 2nd passage formation and space 17a for wedge rib fabrication are added to a necessary part corresponding to the number of isolation partial 2b.

[0028] The optical cover nature resin 2 is filled up with this example into the optical cover nature resin 2 via the space 11 for partial fabrication for towage from the 1st one passage 8 by two or more space 9 for isolation partial fabrication. About other composition and operations, it is the same as that of the aforementioned example.

[0029]

[Effect of the Invention] By this invention method, partial 2c for towage of the optical cover nature resin formed in the metal mold 4 of a second shot at the time of casting of the optical cover nature resin 2 as mentioned above. When a knock-out pin 18 dissociates from metal mold 4, it will be separated from partial for division 2e of the optical cover nature resin in 2d of portions for division of the optical cover nature resin in the 1st passage 8, and the 2nd path 10. Since it does not remain at all in the keytop of a final product, and the keytop excellent in the legibility of discernment of a character or a figure is obtained. [that a shadow is made into the light-transmission nature resin fabrication portion 1 at the time of illumination use of a keytop]

[0030] Moreover, in order to use polyacetal resin, polypropylene resin, and polyamide resin as a light-transmission nature resin and to use the styrene resin represented by ABS plastics as an optical cover nature resin. By changing variously the pressure which joins a keytop in order that a light-transmission nature resin and an optical cover nature resin may not weld in case metal mold 5 is separated after a second shot end, or in case the ejection pin 18 is projected and it dissociates from metal mold 4. It exfoliates in 2h of wall side interfaces where a light-transmission nature resin and an optical cover nature resin contact, and the thin space 24 which is the layer of air can be made.

[0031] By the conventional two-color-molding method, when the light source is made to turn on from a keytop background, since the light-transmission nature resin and the optical cover nature resin are welding by the contact surface, it has an angle in a light-transmission nature resin, and the size of refraction at 2h of wall side interfaces of the light which carried out incidence is decided by the difference of the refractive index of a light-transmission nature resin and an optical cover nature resin. a light-transmission nature resin and an optical cover nature resin — a kind — things — when a resin is used, the amount of the light which the difference of the refractive index in 2h of wall side interfaces has them, and reflects it at 2h of wall side interfaces since the rate of an optical refraction of many resins used for two color molding (nD) is in the range of 1.4–1.6 generally, and is emitted to the exterior of a keytop is decreased [few]

[0032] Since the difference of a 2h [of wall side interfaces] refractive index turns into a difference of the light-transmission nature resin 1 and the air space 24 whose rate of an optical refraction (nD) is 1.0 by the two-color-molding method of this invention to it, Compared with the case where resins weld, the difference of a refractive index is large, as shown in drawing 20, the amount of the light which reflects at 2h of wall side interfaces, and is emitted to the exterior of a keytop is made to increase, and the bright keytop excellent in the discernment nature of a character or a figure is obtained.

[0033] In addition, exfoliation of 2h of wall side interfaces where such a light-transmission nature resin and an optical cover nature resin contact. Although it is generated with the pressure which joins a keytop in case especially a means is provided and metal mold 5 is separated after a second shot end as there is nothing, or in case the ejection pin 18 is projected and a keytop is separated from metal mold 4. For example, if the keytop which established the undercut which is the grade in which an optical cover nature portion does not fall out from a light-transmission nature resin fabrication portion in metal mold 4, or was separated from metal mold after the forming end is bent by hand or a pressure is applied using a fixture, much more positive exfoliation can be performed.

[0034]

[Effect of Example(s)] Since the pillar-like pin 13 for the 1st passage formation, and the pin 14 for the 2nd passage formation are formed in the metal mold 3 of a first shot, the 1st passage 8 is formed in the remains of sampling of this pin 13 and the 2nd passage 10 was formed in the remains of sampling of this pin 14, the sliding mechanism for forming the passage of the optical cover nature resin 2 can be omitted, and the manufacture cost of metal mold can be reduced.

[0035] Since it moves up toward the space 11 for partial fabrication for towage to the metal mold 4 of a second shot, a slide pin 16 is formed and partial 2c for towage was projected from the space 11 for fabrication by this **** slide pin 16, cleaning of the metal mold 4 concerned is simplified, it can move to a next molding cycle immediately, and the working capacity of fabrication is good.

[0036] In fabrication of the keytop showing the character which has two or more isolation partial 2b of an optical cover nature resin, or a figure, or fabrication of the keytop showing two or more characters with isolation partial 2b, or figures. When the space 11 for partial fabrication of an optical cover nature resin for towage is extended and two or more pins 14 for the 2nd passage formation are formed corresponding to isolation partial 2b. Since two or more space 9 for isolation partial fabrication can be filled up with the optical cover nature resin 2 from the 1st one passage 8, processing of metal mold becomes easy and can make manufacture cost cheap.

[0037]

[Example 2] In order to use polyacetal resin (Iupital F40 by Mitsubishi Gas Chemical Co., Inc. -03) and to compare with polyacetal resin as a light-transmission nature resin of a first shot in fabricating a keytop by the two-color-molding method of this invention, polycarbonate resin (you pyrone [by Mitsubishi Gas Chemical Co., Inc.] H3000R), methacrylic resin (VR[by Mitsubishi rayon incorporated company]- 40), and ABS plastics (JSR[by Japan Synthetic Rubber Co., Ltd.] ABS55) were used, and the character portion was fabricated.

[0038] Next, the keytop which covered the circumference of a character using the ABS plastics (JSR[by Japan Synthetic Rubber Co., Ltd.] ABS38B) colored black as an optical cover nature resin of a second shot was created, the same light source was made to turn on from a keytop background, the visibility by viewing was tested, and the result of Table 1 was obtained.

[Table 1]

光透過性樹脂	光源消灯時の視認性	点灯時の光の透過性	点灯時の文字の明るさ
ポリアセタール	○	○	◎
ポリカーボネイト	△	△	△
アクリル樹脂	△	△	△
A B S樹脂	×	×	×

◎ : 極めて良好 ○ : 良好
△ : やや劣る × : 劣る

[0039]

[Example 3] In creating the character keytop of "R" which is the character which has an isolation portion by this invention method as shown in drawing 16 A keytop without a wedge rib is fabricated by the two-color-molding method of the same method as this invention except having used the metal mold which does not prepare a wedge rib for the isolation portion of a character. Next, the portion of the character which surrounds an isolation portion into an isolation portion was not contacted, but the keytop which has a wedge rib from the portion equivalent to a character using the metal mold which prepared the low of height and the wedge rib of a wall configuration with a thickness of 0.3mm was fabricated.

[0040] The pressure needed since a pressure is applied from the rear face of two kinds of this keytop and an isolation portion falls out was measured, and the result of Table 2 was obtained.

[Table 2]

個数	1	2	3	4	5	6	7	8	9	10	平均
楔リブなし	129	168									148.5
楔リブ付き	530	530	530	530	530	515	492	530	530	509	522.6

単位 : グラム

In addition, as a light-transmission nature resin, polyacetal resin (Iupital F40 by Mitsubishi Gas Chemical Co., Inc. -03) was used, and the ABS plastics (JSR[by Japan Synthetic Rubber Co., Ltd.] ABS38B) colored black as an optical cover nature resin were used.

[0041] Although the tabular rib of the rectangle which does not contact 2h of wall side interfaces of a surrounding character portion as a wedge rib 23 was prepared in the aforementioned example On practical use, into a flaw and an isolation portion, if defluxion of an isolation portion is in the state with which an optical cover nature resin can fully be filled up Even if it lengthens the edge of the rib of a rectangular tabular and makes it unite with 2h of wall side interfaces, good may be carried out, and you may prepare the salient of the configurations where the shape of the shape of a cylinder and a cone and others are arbitrary also as a configuration of a rib in one place or two or more places.

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TECHNICAL FIELD

[Industrial Application] this invention relates to the two-color-molding method of the keytop of the illumination nature used for various inputs, such as a car radio, a car stereo, and a push-button phone dial.

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PRIOR ART

[Description of the Prior Art] When fabricating a character and a figure portion by the light-transmission nature resin, fabricating the other portion by the optical cover nature resin and fabricating a keytop, in the keytop showing characters and figures, such as "O" and "A" As shown in drawing 17 and drawing 18 , isolation partial 22b surrounded in the forming portion 21 of the light-transmission nature resin describing the closed contour other than this soma part 22a which fills the outside space of the forming portion 21 of a light-transmission nature resin will exist in the forming portion 22 of an optical cover nature resin.

[0003] By the conventional two-color-molding method, a sliding mechanism is formed in the metal mold of a first shot, and in order to slush the optical cover nature resin 22 into the space for isolation partial fabrication at a second shot, passage like a tunnel is formed. This passage is extended from this soma part 22a of the forming portion 22 of an optical cover nature resin, and since it has passed through some backs of the light-transmission nature resin fabrication portion showing a character or a figure, when the space for isolation partial formation is filled up with the optical cover nature resin 22, an optical cover nature resin will be left behind to the passage concerned.

[0004] Since optical cover nature resin partial 22c in this passage becomes a shadow and appears in the light-transmission nature resin fabrication portion 21 when putting the light sources, such as an electric bulb and light emitting diode, on a tooth-back side and carrying out illumination use of the keytop, it is reducing the legibility of discernment of the character in the portion concerned, or a figure. Moreover, since the configuration structure of the sliding mechanism for passage formation is complicated, golden die making is not easy and manufacture cost becomes high.

[0005] Moreover, using a polycarbonate with the permeability of light, ABS plastics, methacrylic resin, etc. for a light-transmission nature resin fabrication portion as a typical material for creating the keytop of illumination nature by the two-color-molding method conventionally, and using the polycarbonate which does not have the permeability of light in an optical cover nature resin fabrication portion, ABS plastics, etc. is known.

[0006] Thus, when the combination of the resin used conventionally performs two color molding, in a second shot, the plane of composition of two resins welds [the light-transmission nature resin by which cooling solidification was carried out after the first shot end] by pouring of heating melting and the pressurized optical cover nature resin, an interface exists, and it is unified as if there was nothing.

[0007] Thus, in the state where the plane of composition was welded, as shown in drawing 19 , the rate at which the light irradiated with the degree of incident angle behind behind the light-transmission nature resin portion reflects in the interface of a light-transmission nature resin and an optical cover nature resin, and is emitted out of a keytop decreases, reduces the luminosity of a character or a figure, and reduces legibility.

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EFFECT OF THE INVENTION

[Effect of the Invention] By this invention method, partial 2c for towage of the optical cover nature resin formed in the metal mold 4 of a second shot at the time of casting of the optical cover nature resin 2 as mentioned above When a knock-out pin 18 dissociates from metal mold 4, it will be separated from partial for fragmentation 2e of the optical cover nature resin in 2d of portions for fragmentation of the optical cover nature resin in the 1st passage 8, and the 2nd path 10. Since it does not remain at all in the keytop of a final product, and the keytop excellent in the legibility of discernment of a character or a figure is obtained. [that a shadow is made into the light-transmission nature resin fabrication portion 1 at the time of illumination use of a keytop]

[0030] Moreover, in order to use polyacetal resin, polypropylene resin, and polyamide resin as a light-transmission nature resin and to use the styrene resin represented by ABS plastics as an optical cover nature resin By changing variously the pressure which joins a keytop in order that a light-transmission nature resin and an optical cover nature resin may not weld in case metal mold 5 is separated after a second shot end, or in case the ejection pin 18 is projected and it dissociates from metal mold 4 It exfoliates in 2h of wall side interfaces where a light-transmission nature resin and an optical cover nature resin contact, and the thin space 24 which is the layer of air can be made.

[0031] By the conventional two-color-molding method, when the light source is made to turn on from a keytop background, since the light-transmission nature resin and the optical cover nature resin are welding by the contact surface, it has an angle in a light-transmission nature resin, and the size of refraction at 2h of wall side interfaces of the light which carried out incidence is decided by the difference of the refractive index of a light-transmission nature resin and an optical cover nature resin. a light-transmission nature resin and an optical cover nature resin — a kind — things — when a resin is used, the amount of the light which the difference of the refractive index in 2h of wall side interfaces has them, and reflects it at 2h of wall side interfaces since the rate of an optical refraction of many resins used for two color molding (nD) is in the range of 1.4-1.6 generally, and is emitted to the exterior of a keytop is decreased [few]

[0032] Since the difference of a 2h [of wall side interfaces] refractive index turns into a difference of the light-transmission nature resin 1 and the air space 24 whose rate of an optical refraction (nD) is 1.0 by the two-color-molding method of this invention to it, Compared with the case where resins weld, the difference of a refractive index is large, as shown in drawing 20 , the amount of the light which reflects at 2h of wall side interfaces, and is emitted to the exterior of a keytop is made to increase, and the bright keytop excellent in the discernment nature of a character or a figure is obtained.

[0033] In addition, ablation of 2h of wall side interfaces where such a light-transmission nature resin and an optical cover nature resin contact Although it is generated with the pressure which joins a keytop in case especially a means is provided and metal mold 5 is separated after a second shot end as there is nothing, or in case the ejection pin 18 is projected and a keytop is separated from metal mold 4 For example, if the keytop which established the undercut which is the grade in which an optical cover nature portion does not fall out from a light-transmission nature resin fabrication portion in metal mold 4, or was separated from metal mold after the forming end is bent by hand or a pressure is applied using a fixture, much more positive ablation can be performed.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Therefore, in order for an optical cover nature resin fabrication portion not to remain behind a light-transmission nature resin fabrication portion and to check weld of the interface of a light-transmission nature resin fabrication portion and an optical cover nature resin fabrication portion, the purpose of this invention is bright and is offering the two-color-molding method which can fabricate the keytop excellent in the legibility of discernment of a character or a figure.

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MEANS

[Means for Solving the Problem] When it explains using the reference mark in an accompanying drawing, hereafter the two-color-molding method of the keytop of this invention Polyacetal resin or polyamide resin which has the permeability of light at a first shot. Injection molding of the light-transmission nature resin 1 which used polypropylene resin is performed. Injection molding of the optical cover nature resin 2 is performed by styrene resins, such as ABS plastics which do not have the permeability of light at a second shot, it is isolated from this soma part 2a into the optical cover nature resin fabrication portion 2, and there is isolation partial 2b surrounded in the light-transmission nature resin fabrication portion 1.

[0010] While establishing the 1st narrow passage 8 which carried out opening to the tooth-back side in the proper place of the light-transmission nature resin fabrication portion 1 which hits the tooth-back side of the space 7 where this soma part 2a of the optical cover nature resin fabrication portion 2 should be fabricated in a first shot The 2nd narrow passage 10 and the wedge rib 23 which carried out opening to the tooth-back side are prepared for the proper place of the light-transmission nature resin fabrication portion 1 which hits the tooth-back side of the space 9 where isolation partial 2b of the optical cover nature resin fabrication portion 2 should be fabricated.

[0011] In a second shot, while filling up the space 11 for partial fabrication of the metal mold 4 of another side for towage with the optical cover nature resin 2 with which the space 7 for fabrication of one metal mold 5 was filled up through the 1st passage 8, the space 9 for isolation partial fabrication of one metal mold 5 is filled up with the optical cover nature resin 2 through the 2nd passage 10 from this space 11 for partial fabrication for towage.

[0012] Although the mold goods which remained in metal mold 4 are projected by the knock-out pin 18 from metal mold 4 after pulling apart the metal mold 5 of another side from one metal mold 4, a resin is divided around the portions 2d and 2e for division of an optical cover nature resin fabrication portion at this time, and only partial 2c for towage of an optical cover nature resin remains in metal mold 4. Thus, illumination use of the fabricated keytop is carried out in the light sources, such as an electric bulb and light emitting diode, at a tooth-back side.

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EXAMPLE

[Example] the example of illustration — metal mold 4 — the first shot bottom — the metal mold and second shot bottom — it is used also [metal mold / both] this metal mold 4 — a first shot top — it moves up toward metal mold 3, and the slide pin 16 is formed the bottom — metal mold 4 — standing — a slide pin 16 — a top — when it is in the position which moved forward most toward metal mold 3, the undercut 6 is beforehand established in the part to which it stands and which the upper-limit section side of a slide pin 16 contacts

[0014] a first shot top — the position corresponding to the space 7 where, as for the pillar-like pin 13 for the 1st passage formation attached in metal mold 3, this soma part 2a of the optical cover nature resin fabrication portion 2 should be fabricated in a second shot — the character section of a light-transmission nature resin, or the space 17 for figure section formation — projecting — a soffit side — the bottom — metal mold 4 stands and it is close to the upper-limit side of a slide pin 16

[0015] moreover, a top — the pillar-like pin 14 for the 2nd passage formation attached in metal mold 3 is projected to the character section or the space 17 for figure section formation in the position corresponding to the space 9 where isolation partial 2b of the optical cover nature resin fabrication portion 2 should be fabricated in a second shot, and a soffit side stands it, and it is close to the upper-limit side of a slide pin 16

[0016] moreover, a top — to metal mold 3, it is lower than the surrounding space 17 for figure section fabrication which is extended from the space 17 for figure section fabrication of a light-transmission nature resin, and projects to the space 9 where isolation partial 2a should be fabricated, and space 17a for wedge rib fabrication of a thin wall configuration is prepared in the position which does not contact the side attachment wall of the space 17 for figure section fabrication at it

[0017] the first shot shown in drawing 3 from drawing 1 — setting — the light-transmission nature resin 1 from a well-known injection unit — a top — the top from the resin inlet (tunnel gate) 12 of metal mold 3 — the character section of metal mold 3 or the space 17 for figure section fabrication, and space 17a for wedge rib fabrication are filled up

[0018] the first shot top after fabricating the character section or the figure section by the light-transmission nature resin 1 — metal mold 3 and the bottom — if the mold aperture of the metal mold 4 is carried out, it samples to the point of a pin 13 at the half-finished products of a keytop, the 1st passage 8 is formed in marks, and the 2nd passage 10 is formed in the remains of sampling of the point of a pin 14

[0019] it was shown in drawing 3 after the forming end of a first shot — as — the bottom — metal mold 4 — standing — a slide pin 16 — a top — if it is made to retreat in the direction opposite to metal mold 3 (i.e., if it is made to move downward) — the bottom — in metal mold 4, the space 11 for fabrication of partial 2c for towage of an optical cover nature resin is made the bottom — the aforementioned undercut 6 of metal mold 4 appears in the part which hits the medial surface of the space 11 for fabrication

[0020] the second shot shown in drawing 7 from drawing 4 — setting — the optical cover nature resin 2 from a well-known injection unit — a top — the top from the resin inlet (side gate) 15 of metal mold 5 — the space 7 for fabrication of metal mold 5 is filled up this optical cover nature resin 2 — this space 7 for fabrication to the 1st passage 8 — letting it pass — the bottom — the space 11 for partial fabrication of metal mold 4 for towage is filled up — having — further — again — this space 11 for fabrication to the 2nd passage 10 — letting it pass — a top — the space 9 for isolation partial fabrication of metal mold 5 is filled up the bottom — of the undercut 6 of metal mold 4, 2f of undercut portions of a convex is formed outside at the side of partial 2c for towage

[0021] The wedge rib 23 projected to the space 7 for fabrication at this time remains with the configuration maintained which deformed with the heat and pressure of the optical cover nature resin 2 which flowed into the space 7 for fabrication, and deformed with cooling of the optical cover nature resin 2, and solidification.

[0022] the second shot top after fabricating the inside space and outside space of a character by the optical cover nature resin 2 — metal mold 5 and the bottom — if the mold aperture of the metal mold 4 is carried out — the bottom — the keytop containing partial 2c for towage remains in metal mold 4 further the bottom — since a tension load concentrates and is added to partial for fragmentation 2e of the optical cover nature resin in 2d of portions for fragmentation of the optical cover nature resin in the 1st passage 8, and the 2nd passage 10 for the 2f of the aforementioned undercut portions when a knock-out pin 18 separates a keytop from metal mold 4, as shown in drawing 6, the optical cover nature resin fabrication portion 2 is torn off and divided in these parts

[0023] If polyacetal resin or polyamide resin, and polypropylene resin are used as a light-transmission nature resin at this time and styrene systems, such as ABS, are used for it as an optical cover nature resin like this invention, since weld by the contact surface of a light-transmission nature resin and an optical cover nature resin will be checked, partial 2c for towage of an optical cover nature resin is easily separated in 2g of interfaces of the portion for towage in contact with the light-transmission nature resin.

[0024] Moreover, in the state where it is not welding to the surrounding light-transmission nature resin 1, it dissociates and isolation partial 2b of the optical cover nature resin which remained in the keytop at this time does not drop out, either, in order to act as a wedge at which the transformed wedge rib 23 turned.

[0025] in order to slush the optical cover nature resin 2 into isolation partial 2a — the bottom — it was fabricated in metal mold 4 and partial 2c for towage of the optical cover nature resin used as a tension means at the time of fragmentation was shown in drawing 7 —

as — the bottom — it moves up in the vertical direction of metal mold 4, and a slide pin 16 projects compulsorily from the space 11 for fabrication

[0026] the bottom which forms 2f of undercut portions in the side of partial 2c for towage — frictional resistance which stands although kicked, escapes from the undercut 6 of metal mold 4 at the time of ejection by the slide pin 16 from which it does not escape from the space 11 for fabrication in case partial 2c for towage separates a keytop by the knock-out pin 18, and comes out — or it is set up so that it may be caught and resistance may be obtained The side configuration of partial 2c for towage is not limited to this, but can be variously changed within limits which can attain the aforementioned function.

[0027] In for example, the case of the keytop showing the character which has two or more isolation partial 2b of the optical cover nature resin surrounded in the light-transmission nature resin portion 1 as shown in "B", or a figure or in the case of the keytop to express [two or more], the character which has isolation partial 2b surrounded in the light-transmission nature resin portion 1 like "AB", and a figure As shown in drawing 15 from drawing 10 , the space 11 for partial fabrication of an optical cover nature resin for towage is extended, and the pin 14 for the 2nd passage formation and space 17a for wedge rib fabrication are added to a necessary part corresponding to the number of isolation partial 2b.

[0028] The optical cover nature resin 2 is filled up with this example into the optical cover nature resin 2 via the space 11 for partial fabrication for towage from the 1st one passage 8 by two or more space 9 for isolation partial fabrication. About other composition and operations, it is the same as that of the aforementioned example.

[Translation done.]

*** NOTICES ***

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is up Shimokane type drawing of longitudinal section just before one example of this invention method is shown and being filled up with a light-transmission nature resin in a first shot.

[Drawing 2] It is up Shimokane type drawing of longitudinal section immediately after filling up with a light-transmission nature resin in a first shot.

[Drawing 3] a first shot — setting — the upper and lower sides — it stands by performing the mold aperture of metal mold, and a slide pin is moved — making — the space for fabrication of the portion for towage — the bottom — it is drawing of longitudinal section in the state where it made to metal mold

[Drawing 4] It is up Shimokane type drawing of longitudinal section just before being filled up with an optical cover nature resin in a second shot.

[Drawing 5] It is up Shimokane type drawing of longitudinal section immediately after filling up with an optical cover nature resin in a second shot.

[Drawing 6] It is drawing of longitudinal section in the state where performed the up Shimokane type mold aperture in the second shot, and the knock-out pin divided the portion for towage of an optical cover nature resin.

[Drawing 7] the second shot bottom — it is drawing of longitudinal section when standing the portion for towage of an optical cover nature resin from metal mold, and projecting by the slide pin

[Drawing 8] It is drawing of longitudinal section of the keytop removed from metal mold, and is illuminated and used from the direction of an arrow.

[Drawing 9] It is the front view of this keytop.

[Drawing 10] It is up Shimokane type drawing of longitudinal section just before the isolation portion of an optical cover nature resin shows another example of this invention which fabricates the keytop which has more than one and fills up a light-transmission nature resin with a first shot.

[Drawing 11] It is up Shimokane type drawing of longitudinal section immediately after filling up with a light-transmission nature resin in a first shot.

[Drawing 12] It is up Shimokane type drawing of longitudinal section immediately after filling up with an optical cover nature resin in a second shot.

[Drawing 13] the second shot bottom — it is drawing of longitudinal section when standing the portion for towage of an optical cover nature resin from metal mold, and projecting by the slide pin

[Drawing 14] It is drawing of longitudinal section of the keytop removed from metal mold, and is illuminated and used from the direction of an arrow.

[Drawing 15] It is the front view of the keytop of drawing 14 .

[Drawing 16] It is the perspective diagram of the creation process of the keytop concerning still more nearly another example of this invention.

[Drawing 17] It is drawing of longitudinal section of a keytop fabricated by the conventional method, and illumination use is carried out from the direction of an arrow.

[Drawing 18] It is the front view of a keytop shown in drawing 17 .

[Drawing 19] It is the important section cross section showing the reflection model of the incident light in the interface of the light-transmission nature resin of a keytop, and an optical cover nature resin created by the conventional method.

[Drawing 20] It is the important section cross section showing the reflection model of the incident light in the interface of the light-transmission nature resin of a keytop, and an optical cover nature resin created by this invention method.

[Description of Notations]

1 Light-Transmission Nature Resin Fabrication Portion for Character Section or Figure Sections

2 Optical Cover Nature Resin Fabrication Portion

2a A part for this soma of an optical cover nature resin fabrication portion

2b The isolation portion of an optical cover nature resin fabrication portion

2c The portion for towage of an optical cover nature resin fabrication portion

2d The portion for division of an optical cover nature resin fabrication portion

2e The portion for division of an optical cover nature resin fabrication portion

2f The undercut portion of the portion for towage

2g The interface of the portion for towage in contact with the light-transmission nature resin

2h The wall side interface where a light-transmission nature resin and an optical cover nature resin contact

3 First Shot — Public Funds — Type

4 Metal Mold of Combination to First Shot and Second Shot
5 Second Shot — Public Funds — Type
6 Undercut of Metal Mold
7 Space for this Soma Part Fabrication of Optical Cover Nature Resin Fabrication Portion
8 1st Passage
9 Space for Isolation Partial Fabrication of Optical Cover Nature Resin Fabrication Portion
10 2nd Passage
11 Space for Partial Fabrication for Towage
12 Resin Inlet of First Shot
13 Pin for 1st Passage Formation
14 Pin for 2nd Passage Formation
15 Resin Inlet of Second Shot
16 Stand and it is Slide Pin.
17 Space for Fabrication of Light-Transmission Nature Resin Fabrication Portion
17a Space for wedge rib fabrication
18 Knock-out Pin
23 Wedge Rib
24 Air Space Produced by Ablation

[Translation done.]